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Mapping and documenting conflicts between Users and Built Environments

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Abstract

The step-by-step expansion of the corpus of design knowledge, to incorporate the needs and wishes of the real diversity of users, requires a large amount of additional information about environment-related human 'dis-abilities' (limitations and possibilities).

To arrange and document this large amount of new design information there is a need in the first instance for a global model that makes it possible to map in a theoretical and deductive manner the relevant diversity of users and the complexity of built environments. To this end, a Universal Design **Users – Built Environments Model** is elaborated to list the users' disabilities and activities, and to map the matching aspects and elements of built environments (mapping).

In the second instance, the empirically detected disabling aspects and elements of built environments must be analysed in greater detail to assist decision-makers and designers. This information about both people - environment 'Conflicts' and empirically based 'Resolutions', is documented in a so-called Universal Design Pattern database (documenting).

Keywords. Inclusive Design, methodological design approach, supportive design tools Universal Design, Universal Design Patterns, user-centred design.

1. Introduction

The British Standards Institute describes Inclusive Design [1] as: "Design of mainstream products and/or services that are accessible to, and usable by, people with the widest range of abilities within the widest range of situations without the need for special adaptation or design." Jane Alexander, in her introduction to "Strategies for teaching Universal Design" clearly describes the UD concept in a similar sense.

> "The concept of universal design goes beyond the mere provision of special features for various segments of the population. Instead it emphasizes a creative approach that is more inclusive, one that asks at the outset of the design process how a product, graphic communication, building, or public space can be made both aesthetically pleasing and functional for the greatest number of users. Designs resulting from this approach serve a wider array of people including individuals with temporary or permanent disabilities, parents with small children, and everyone whose abilities change with age." [2]

In the above holistic sense, we have chosen the term Universal Design (UD) for our research in the field of architectural education. Moreover, we consider UD to be an academic

and a professional research and design response to a democratic requirement and to a social concept for the achievement of integral and inclusive accessibility and utility.

The new UD design approach requires of designers, builders and managers both a much broader insight into the interoperative modi of human perception and a greater knowledge of the physiological, physical and mental functions of people. All this relates to an expanding diversity of users.

In the context of this paper, we focus our attention specifically on the great need for relevant information for evidence-based decision-making and for Universal Design. Recent research by Weytjens, Verdonck and Verbeeck (2009), into the use of Design Support Tools (DSTs) by architects, based on a survey of 224 Belgian architects, shows that 94.5% of architects make use of knowledge-based tools. Moreover, more than 30% of those questioned state that they need more information-providing tools to support their design process. The study concludes that "for the future, additional support [in the architectural design process] is mainly required for evaluation and analysis, for communication, and through knowledge-based DSTs." [3]

Essential in our work of systematic mapping and documenting conflicts between Users and Built Environments, is a thorough research and presentation (UD Patterns) of needs and wants of people with permanent, temporary and / or situational functional limitations. This research occurs both theoretically / deductively (model) and empirically / inductively (patterns).

2. UD Users - Built Environments Model (theoretical / deductive)

Our UD Users - Built Environments Model (Fig. 1) examines several recent models, among them the World Health Organization, International Classification of Functioning, Disability and Health, known more commonly as ICF [4], the Dutch design guide 'Geboden Toegang' (access offered / advised) [5], and the Ergonomic Model [6]. In the ICF list of Contextual Factors, the Personal Factors (Psychosocial environment) are not relevant here, but a more detailed and separate set of Aspects (variables) and Elements, relating to physical environments, is elaborated.

These 'Aspects' and 'Elements', relative to Built Environments, are not based on existing lists of models, but are developed in the course of our research.

Built Environments, 'ASPECTS' column

Under environmental aspects (variables) spatial conditions and characteristics are arranged that offer support (enabling) for the universal human task cycles: Sense (intake) / Perceive (throughput) / Act (output). This embryonic list, with aspects from daylight to ergonomic characteristics, is mainly indicative, and was constructed gradually and in an inductive manner from the clues and results that gradually became clearer during the many years of experimental construction of UD Patterns, and associated design exercises with architectural students [7].

Built Environments, 'ELEMENTS' column

The elementary and illustrative spatial elements and facilities that are arranged here, can be viewed as stereotypic settings for universal scenarios of human Approach / Access / Negotiation / Use of built environments and outside spaces. This list of illustrative 'Elements' also grew as subjects for UD Pattern research in the successive research projects of architectural students.

The model provides a multi-perspective approach to the classification of the functioning / disability of Users versus Built Environments, as an interactive and evolutionary process. It provides building blocks for researchers, decision-makers, professionals and users who wish to document an evidence-based UD process and to study different aspects of this process. In

this way, the model can be seen as a language: the texts that can be created with it depend on the intention of the users, their creativity and their scientific / professional orientation.

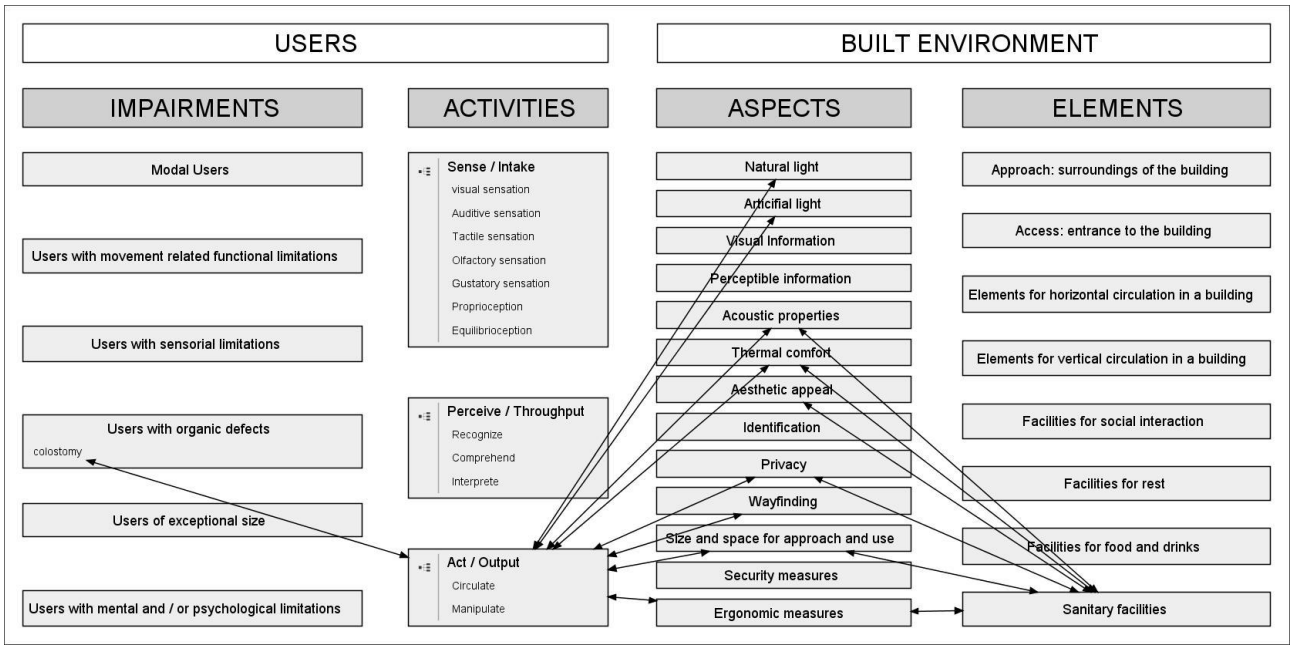


Figure 1. UD Users - Built Environments Model (embryonic list) with for example some causal links for personal stoma care [8] in public toilets

3. UD Patterns (inductive / empirical)

Universal Design Patterns form the core elements of our methodological approach. In a structured way, they provide both relevant information about Problems (Conflicts) that are experienced in handicap situations by users, whether they have specific permanent or non-permanent (temporary or situational) limitations, and empirically supported architectural / technological Solutions (Resolutions).

Our extensive research, carried out from 2001 onward, focuses on mapping and documenting the conflicts between the diversity of Users and Built Environments, and on Universal Design Patterns (UD Pattern databases) as key elements in the process of the systematic elimination of handicap situations in built environments [9].

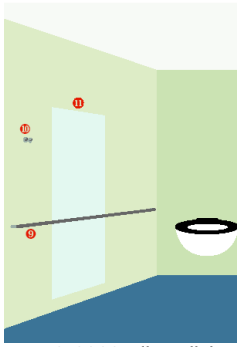
In addition to the UD Patterns, the overall research project comprises six complementary components of a methodological approach: Empirical research – Simulations – Users / experts in collective design processes – Integral Quality Control – Post Occupancy Evaluation – Universal Design Education & Research.

The accurate description of the ‘why’ for each design pattern is characteristic. For the development and the continual updating and improvement of UD Patterns we propose that conventional empirical research be combined with peer review (users / experts) and with a broad exchange of (Open Content, OC) information and communication via the Internet.

The diagram below summarises the different paragraphs of such a UD Pattern (under construction). This model construct places special emphasis on the needs of semi-ambulant users and on the personal care facilities needed by users with a stoma, this to stress the need for complementary research, and to explore the ways this research can be conducted, online and ‘in vivo’.

UNIVERSAL DESIGN PATTERNS: Toilet facilities in public buildings.

UD Pattern 01.01: (Semi-)ambulant or 'Ambulatory' Toilet Stall. Personal care.



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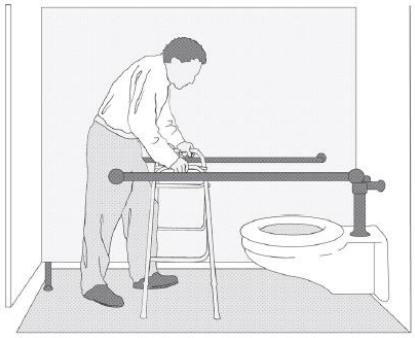

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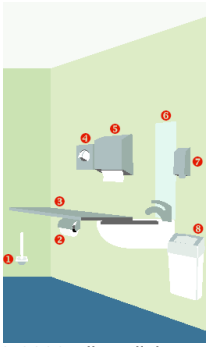

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• Introductory paragraph with references to related UD Patterns for which this specific UD Pattern serves as a supplement.

In a general introduction, the overall role of urban design in reversing the trend of inadequate toilet provision can be highlighted. Reference can be made to a higher level UD Pattern 00.01 General, which lists the potential Conflicts of a diversity of users in 'away from home' toilet facilities [10]. This general pattern also documents architectural / technological solutions (Resolutions) and sets out design guidelines that meet both user needs and provider requirements.

• Problem Definition (CONFLICTS)

- 0.0 Modal users (average, standard). This includes users who are tired, pregnant, stressed, ill or injured, undergoing medical treatment, under the influence of alcohol or drugs, as well as travellers with a pram, with baggage or with heavy or sizeable objects.
- 1.0 Users with neuromusculoskeletal and movement related functional limitations. Functional limitations and handicap situations can result from problems in the area of movements, actions and mobility.
- 2.0 Users with sensory limitations. Functional limitations and handicap situations can result from problems in the area of perception.
- 3.0 Users with organic defects. Functional limitations and handicap situations can result from problems in the area of required physical effort. The Users - Environments conflicts, and particularly the needs of users with colostomy, ileostomy and urostomy, are analysed and documented under this section.
- 4.0 Users of exceptional size. Functional limitations and handicap situations can result from inappropriate size and space for approach and use, or problems in the area of anthropometrics.
- 5.0 Users with mental and/or psychological limitations. Functional limitations and handicap situations can result from problems in the area of cognitive, neurological and psychological capacities.

• Results and sources of empirical research

Relevant sources that analyse and document the needs of the relevant diversity of users are listed here. Complementary empirical research provides the missing information.
In the context of this specific UD Pattern (Semi-)ambulant or 'Ambulatory' Toilet Stall, for example, movement related functional limitations or the needs of users who are semi-ambulant, have been quite well documented, but relevant information on personal care of users with a stoma is rather exceptional [11].

• Architectural / Technological solution (RESOLUTION)

The concept for the (Semi-)ambulant or 'Ambulatory' Toilet Stall is based on the layout of a conventional toilet stall (M or F) with additional features. An outward-swinging door provides adequate inside space for a diversity of users (including guide dogs), and there are additional horizontal grab bars. Clothes hooks, hand wash basin, a large waste bin for incontinence pads, stoma bags, catheter bags, and urine containers, a small shelf and a mirror, a good ventilation system and decent lighting, further provide the necessary facilities for users with stoma.

.• Closing paragraph with references to related UD Patterns that supplement and round out this specific pattern

Reference is made here to a selection of small scale UD Patterns that further detail elements and aspects of a (Semi-)ambulant or 'Ambulatory' Toilet Stall. For example UD Pattern X: Large waste bin, UD Pattern Y: Washbasin, or UD Pattern Z: Shelf.

4. Generating and updating UD Patterns

Three distinct parties are involved in the process of generating and updating UD Patterns:

● The Research & Development Team. A team with specialists from different medical and paramedical disciplines, with architects, interior architects, engineers, product designers, communication specialists, IT specialists, and psychologists.

● Users / Experts. A user / expert can be anyone who has developed natural experience in dealing with the challenges of our built environment [12].

● Designers and Decision-makers in the process of building production [13]. Universal Design Patterns are primarily developed as supportive tools for those who design, construct and maintain the built environment.

In principle, the Research & Development Team will take the initiative to generate or to update specific UD Patterns, but also Users / Experts can detect and communicate misfits in the interaction with objects, urban spaces, and buildings. Finally, Designers and Decision-makers in the process of building production can analyse the formulated conflicts and can document technological / morphological resolutions.

Feedback from all six of the complementary components of the methodological approach, mentioned in paragraph 3.UD Patterns, are channelled back into the UD Patterns.

5. Conclusion

The elaborated UD Users - Built Environments Model in itself does not model the process of interaction between human disability and functioning in given environments. It can be used, however, to structure the process of gathering design information by providing the means to map the different constructs and domains.

UD Patterns, by their descriptive nature, are expected to contribute to a broad user-oriented design and building culture to complement the prescriptive European, national and regional laws and norms that are increasingly demanding physical accessibility for all citizens.

The strong emphasis on building performance, in our methodological approach, is of utmost importance, since professionals rarely exceed the legislative prescriptive minima in providing access [14].

Last but not least, we view such UD Patterns for the built environment not only as carriers of information, but also as (OC) forums and as tools in the on-going search for temporal, social, academic and professional consensus.

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- 2003-2004. UD MUSEUM: Ethnographic Museum, Antwerp (B),
44 architecture students, 22 UD related topics, 147 UD Patterns, and 56 sub patterns;
- 2004-2005. REGO, UD Rehabilitation and Health Care center VJZ, Hasselt (B),
43 architecture students, 21 UD related topics, 119 UD Patterns, and 0 sub patterns;
- 2005-2006. UNIVERSAL CARE HOTEL, Herk-de-Stad (B),
53 architecture students, 18 UD related topics, 101 UD Patterns, and 102 sub patterns;
- 2006-2007. UD ACCESSIBILTY OFFICE ' ENTER ', Hasselt (B),
58 architecture students, 18 UD related topics, 83 UD Patterns, and 184 sub patterns;
- 2007-2008. UD SOCIAL WELFARE CAMPUS, OCMW Genk (B),
60 architecture students, 20 UD related topics, 71 UD Patterns, and 0 sub patterns.
Total number of participating third year architecture students: 258 for five subsequent academic years. Total number of UD Patterns: 521 + 342 sub patterns = 863
8. **A stoma** is an artificial opening on the abdomen to collect waste (either faeces or urine). The waste products are collected in a reservoir bag, or pouch, on the outside of the body. In situations away-from-home people with stomas use public toilets to clean their stoma and change or empty their colostomy bag
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